

# UNDERSTANDING & EVALUATING STORMWATER NETWORK PERFORMANCE IN TĀMAKI MAKAURAU (AUCKLAND)

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## ABSTRACT

Understanding the performance of the stormwater network and its impact on the environment and community is under growing scrutiny, putting increased pressure on councils to account for service delivery. Stormwater is of particular focus due to 2023 weather events, together with aging infrastructure and longstanding community expectations. It is therefore imperative that the performance of the network is assessed and reported to provide accountability as well as stimulate continuous improvement and efficiency.

For Tāmaki Makaurau Auckland, the region-wide stormwater network discharge consent (NDC) is founded around this need to assess and report on ongoing performance. A critical element is the development and implementation of a Monitoring and Evaluation Strategy, which establishes how data is collected and used to assess stormwater performance under the consent.

Understanding stormwater network effects is challenging due to connections with land use activities, overlapping responsibilities, and its open and diffuse nature. These complexities and challenges mean that a range of data sources and knowledge must be collated and analysed. Thus, the Strategy framework comprises four core pillars:

- monitoring,
- modelling,
- performance measures,
- benefit realisation.

This paper describes each pillar, the corresponding programmes and how the data is used inform actions and prioritisation. The pillars reflect how results from state of the environment monitoring (SoE), watercourse assessments, and other more targeted sampling programmes complement and feed into modelled results for fresh and coastal water quality, stream erosion, criticality and flood hazards. Together these provide spatial and temporal coverage of the region. The pillars also capture the impact and benefits of stormwater upgrade and improvement programmes, even where these are not quantifiable, as a means of demonstrating accountability.

The NDC includes a range of quantitative and qualitative targets for the assessment of progress towards achieving consent outcomes and objectives. The findings from the Strategy are used to demonstrate performance against the targets through the regular 6-year reviews of the NDC. These targets are also reviewed and updated to ensure the NDC remains relevant over time.

The first review of the NDC in 2022 highlighted the challenges of linking programme delivery to improvements on the ground. The next step for the Strategy is therefore to address this gap while also enabling efficient use of data sources and alignment of existing work programmes to provide multiple benefits. Other initiatives include ongoing improvements in modelling, targeted stormwater device monitoring, use of new technology, such as drones for surveys and AI, and ways of embedding cultural monitoring and citizen science.

Auckland is not alone in this challenge, with councils across the country spearheading such innovative thinking. The new government has foreshadowed that higher levels of transparency will be required of the water sector through information disclosures and potential economic regulation. This type of monitoring and reporting will be important for demonstrating the benefits of stormwater investments under this type of regime. However, the country's pool of technical experts and engineers in stormwater management is limited and day-to-day pressures mean they have little bandwidth to work strategically with other regions. It is imperative that institutions actively working in stormwater management lead the scoping and development of such measures, based on the ground learnings such as those outlined in this paper, ideally through a legislative framework or at minimum through a pan-regional centre of excellence.

## **KEYWORDS**

**Environmental performance, monitoring, integrated stormwater management, resource consents.**

## **1. INTRODUCTION**

Auckland Council's Healthy Waters department is responsible for the management of Auckland's public stormwater system. The Regionwide Stormwater Network Discharge Consent (NDC) authorises the diversion and discharge of stormwater from the current and future public stormwater network in the urban area. Under the NDC, the Monitoring and Evaluation Strategy ("the Strategy") is the key mechanism to assess performance. Data collected through the Strategy is used in the regular NDC reviews to provide accountability and stimulate continuous improvement as well as to inform prioritisation of projects and programmes.

### 1.1. AUCKLAND'S REGIONWIDE STORMWATER NETWORK DISCHARGE CONSENT

The public stormwater system in Tāmaki Makaurau collects stormwater runoff from over 400,000 properties and 7,400 km of roads. Over 500 million cubic metres of stormwater is discharged into our streams and harbours and coasts each year through around 4,000 outfalls and 79,000km of overland flow paths. In order to operate and develop Auckland's stormwater network consistently across the region, a single Auckland-wide stormwater network discharge consent was sought and granted in 2019.

The key aim of the NDC is to achieve continuous improvement in overall stormwater management outcomes for the community and natural environment at both a regional and local scale, including providing for growth as well as progressively reducing the adverse effects associated with the existing network. The key issue areas addressed in the NDC are illustrated in Figure 1 and reflect the complex nature of stormwater in terms of its potential effects and associated mitigation measures. As discussed below, the extensive scope of the NDC requires a correspondingly broad monitoring strategy.



Figure 1: Issues identified in Schedule 2 of the NDC for managing the Auckland stormwater network.

### 1.2. NEED FOR CLEAR LINKAGES BETWEEN ACTION AND OUTCOMES

Public sector reporting on performance is under scrutiny. Cost of living pressures, together with rates rises, have put increased pressure on councils to account for delivery. Stormwater is of particular focus due to recent weather events, together with longstanding community expectations related to water quality and well-functioning urban development environments which are still to be realised in a context of aging and under-performing infrastructure.

This need for accountability however is set against a backdrop where clear performance measures and standards have been identified as lacking. As reflected in the 2022 Parliamentary for the Environment report *Environmental reporting, research and investment – Do we know if we’re making a difference?:*

*"The scale and complexity of environmental challenges is not well handled by our current system of public accountability focused on individual agencies....There is a maze of strategies, all sorts of agency-level initiatives and virtually no systematic way to evaluate whether we’re making a difference. Parliamentarians and citizens are not provided with information in a form that can be easily used to hold governments to account."* (p.4)

The 2023 Auditor General Reporting on the public sector’s performance in Tāmaki Makaurau Auckland also identified:

*"Our Office has been concerned about how public organisations report their performance for some time. The public needs to know what we are getting for our taxes and rates, and this is often difficult if not impossible to determine from publicly available information. Although this report focuses on Auckland, all communities in New Zealand would in our view benefit from public organisations reporting their performance at a local level."*

Stormwater performance measures may be developed through powers set out by the Taumata Arowai – Water Regulation Act 2020, though it is unclear when this may occur, as the focus of the current government appears to be on wastewater and water supply. The current government review of the National Policy Statement for Freshwater Management has also created uncertainty on potential targets that may have been established through this mechanism. In the interim therefore the identification of performance will likely need to continue through a myriad of processes as set out under the NDC, LTP and other internal council direction.

### **1.3. CHALLENGES OF ASSESSING STORMWATER NETWORK PERFORMANCE**

Understanding the performance aspect being evaluated is fundamental to determining indicators and targets from which performance and progress can be measured. In terms of evaluating stormwater network performance, this can be approached from different perspectives, including environmental considerations, health and safety aspects, infrastructure and assets management, cost efficiencies and consent compliance.

Furthermore setting meaningful performance standards and understanding stormwater network effects is challenging due to connections with land use activities, overlapping responsibilities, the open nature of the network and the diffuse character of stormwater discharges.

The open nature of the network means that stormwater is not only running in piped systems, but also in overland flow paths and waterways, as the natural landform is an integral and inseparable part of the stormwater path. The network is accessible to a wide range of users and it crosses varied land uses, not being restricted or controlled by a single entity. As a result, there are a range of factors that influence the environmental performance of the network and require a high level of cooperation and collaboration with mana whenua, communities, other infrastructure providers, regulators and developers in order to achieve positive outcomes.

The diffuse nature of stormwater discharges arises from multiple points of discharge, making it impractical to sample each outfall or discharge point. As stormwater performance is also driven by rain events, it is also realistically impossible to sample during all diverse hydrological events.

The complexities and challenges involving stormwater means that a range of data sources and varied sources of knowledge combined are required, as no single set of information is sufficient to assess the broad scope of the stormwater network. Sources include state of environmental monitoring, targeted performance monitoring, modelling as well as capturing benefits from projects and infrastructure improvement works.

## **2. PURPOSE AND STRUCTURE OF THE NDC MONITORING AND EVALUATION STRATEGY**

The NDC Monitoring and Evaluation Strategy establishes how data is collected and used to assess performance across a range of aspects involving the impact of the stormwater network. The Strategy is established to achieve multiple purposes:

1. Assess performance and progress against the outcomes and objectives of the stormwater diversion and discharges authorised by the NDC as per NDC Schedule 2 targets and including the effectiveness of the NDC best practicable option (BPO) (including associated schedules, requirements and interventions).
2. Input into NDC review cycles so that the BPO to manage stormwater evolves to reflect changing circumstances and remains fit for purpose over time. (Figure 2)
3. Understand how network discharges are impacting the environment and te mana o te wai.
4. Provide transparency of the effectiveness and performance of the NDC.
5. Provide evidence to support planning, decision-making and prioritisation of investment decisions within Healthy Waters.
6. Inform wider council reporting such as the Long Term Plan.

The extensive scope of the NDC in turn requires a correspondingly broad monitoring strategy. To comprehensively assess the impact and efficacy of the

stormwater network and NDC consent, the Strategy goes beyond the assessment of environmental effects of the stormwater discharges by also including evaluation of the NDC processes, programmes and management practices. Thus, the assessment of the NDC performance requires a variety of types of monitoring, both evaluative and measurable. This is reflected in the title 'Monitoring and Evaluation Strategy' rather than simply 'Monitoring Strategy' as required under the consent, as this better represents the range of monitoring and evaluation required.

Furthermore, the scope of the programmes which make up the Strategy go beyond the piped stormwater network as the information included is useful to understand network performance in a broader sense through recognition of the critical roles of land use and activities, as well as overland flowpaths and watercourses in stormwater management. This is needed to inform Healthy Waters infrastructure, operational, community empowerment and compliance projects and initiatives, all of which are essential in improving wider network performance. Such recognition of the stormwater network as an open system comprised of the piped network together with the overland flowpaths and watercourses aligns with the definition of stormwater network under the Water Services Act 2021 (as amended in February 2024).

To reflect this complexity, the Strategy divides the sources of information into four categories, named 'pillars' (Figure 3)

1. **Monitoring Programmes** - encompasses the existing broad environmental data collected by the council family (e.g., State of Environment Reports) as well as specific programmes driven by Healthy Waters (e.g., Watercourse Assessments), including targeted monitoring programmes developed as part of the NDC implementation.
2. **Modelling Programmes** – these are a key focus for Healthy Waters, with ongoing expansion, improvement and validation processes. Flood modelling and Safeswim are well used and recognised. The Freshwater Management Tool (FWMT) and upcoming Integrated Coastal modelling are important components of the NDC management, as well as stream erosion and asset and stream criticality frameworks and models.
3. **Assessment of Performance Measures and Processes** - these are fundamental for understanding the effectiveness of the NDC implementation, and the targets come from a range of regulatory sources. This pillar brings together a range of performance measures identified through other processes, such as LTP and other internal directives, as well as additional measures required under the NDC to enable a "one-stop" shop as well as remove duplication and inconsistencies.
4. **Benefit Realisation of Projects and Programmes** – these are designed to capture the range of benefits from capital infrastructure works as well as other specific programmes and initiatives. Many of those programmes will provide qualitative and anecdotal benefits, which cumulatively contribute towards the NDC objectives and outcomes.

Each pillar includes information which can be used in multiple ways which have their own benefits and drawbacks. Combining a variety of datasets and sources ensures that the Strategy is able to provide a robust picture of the performance of the NDC and the stormwater network. Many programmes also have links across multiple pillars.

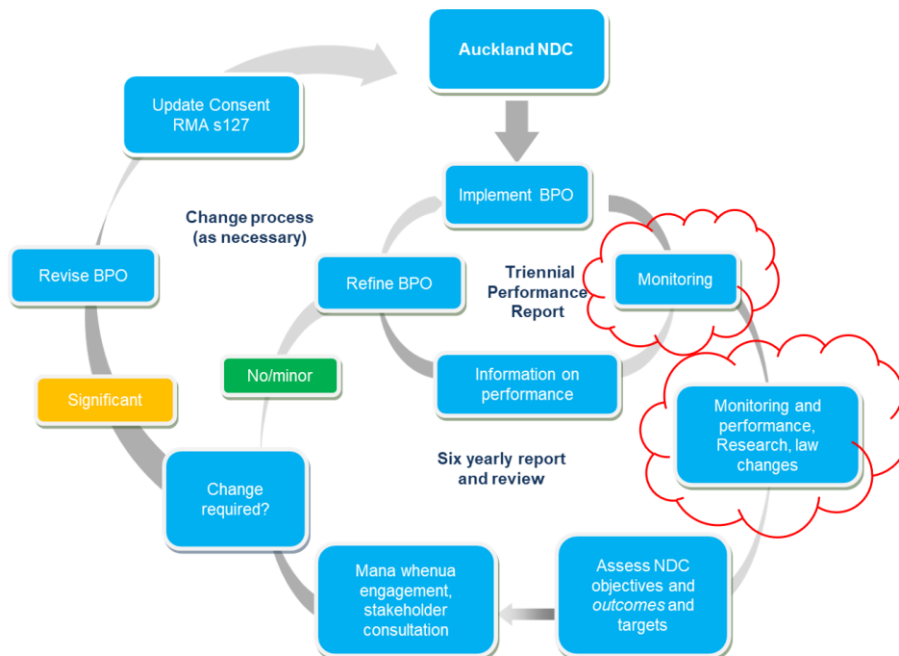


Figure 2: Role of monitoring in the continuous improvement cycles of the NDC review structure.

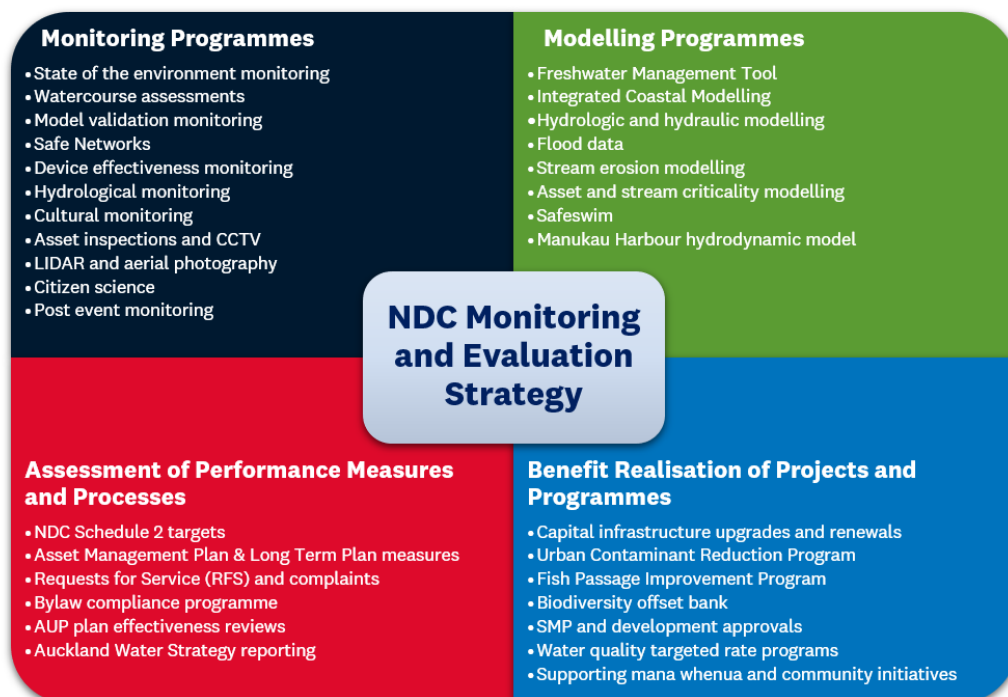


Figure 3: Overview of the four pillars of the NDC Monitoring and Evaluation Strategy and the programmes included within each pillar.

## 2.1. MONITORING PROGRAMMES

Environmental monitoring through the physical sampling and analysis for water quality or undertaking on-the-ground stream walkovers tends to be what first comes to mind when people think of a monitoring programme. A wide range of monitoring is undertaken by the wider Auckland Council family and Healthy Waters for various purposes. The monitoring programmes included in the Strategy are described below, with Table 1 in Section 3 summarising how information from each of these programmes is used to assess NDC performance.

- State of the environment monitoring
- Watercourse assessments
- Model Validation Monitoring
- Safe Networks
- Device effectiveness monitoring
- Hydrological monitoring
- Cultural monitoring
- Asset inspections and CCTV
- LIDAR and aerial photography
- Citizen science
- Post event monitoring (e.g., large flooding event)

In the first 6-yearly review (2022), the environmental information available from both SoE and modelled programmes pre-dated the issue of the consent and therefore were used as a baseline from which to gauge the performance of the NDC moving forward (3-yearly reporting cycle).

To specifically understand the effects of the stormwater network, some of this information is more useful or applicable than others. For instance, SoE monitoring provides useful information on trends in the broader environment, however it is limited on assessing the effects of stormwater discharges, as it assesses the regional effects from a myriad of additional factors and source of contaminants, including rural, industrial, boat marinas and other point source discharges. However, any such evaluation has inherent limitations. These include the large number of urban activities and land uses that contribute to the generation of runoff and the contaminants in it which enter the receiving environments. Effects on the environment are also cumulative and may take some time before they are measurable.

Therefore, to assess the effects of stormwater discharges and mitigation, consideration must be given to legacy issues and existing interventions, as well as new development and water improvement initiatives. This is called hysteresis; i.e delayed responses to ongoing and new land use changes and interventions. There can be considerable time lag between the adoption of management practices and the detection of improvement in water quality and stream health. This is due to the time it takes for a practice to be adopted, the time for that practice to produce an effect, and the time for rivers or coastal waters to respond to that effect. Differences in these processes for different water quality



variables can range from years to decades. Furthermore this is all occurring in the context of a changing climate.

As a result, performance of the network cannot be assessed on environmental monitoring alone. Therefore, in addition to other types of monitoring undertaken to assess network performance, such as asset condition (e.g. asset inspections, CCTV, watercourse assessment surveys) as well as flooding impacts from large storm events, the Strategy has identified the tools and information in the 3 pillars described below. For instance, SoE data for representative catchments will need to be combined with stormwater quality modelled data and any other available catchment specific monitoring data to give a picture of the performance of the stormwater network in general as well as its effects in those catchments.

## **2.2. MODELLING PROGRAMMES**

As discussed above, environmental monitoring is key in understanding current state, however on its own cannot capture all events everywhere, nor can it determine sources. Variation in water quality and causes is highly challenging to discern without continuous, repetitive and therefore costly, monitoring.

Models are therefore needed to fill in these gaps, and identify where, when, how and under what conditions activities will have an effect, both in time and across larger space of whole-catchments. This information is then able to be shared and used.

Current modelling undertaken and being development by Healthy Waters includes:

- Freshwater Management Tool
- Integrated coastal modelling
- Hydrologic and hydraulic modelling
- Stream Erosion modelling
- Asset Criticality Programme
- Stream Criticality Programme
- Safeswim

Hydrologic and hydraulic modelling has been implemented in Auckland for decades, leading to a significant amount of modelled flood data, which has provided eminent value in policy planning, stormwater management as well as development and design. The current development of models such as the Freshwater Management Tool aims to do the same for water quality information.

Models are also used to establish and understand criticality for a variety of assets in order to prioritise work programmes, with well established models for pipe criticality, and models in development for streams.

All models also enable improved public awareness of stormwater issues, most notably Safeswim, which has been specifically developed to reduce exposure to poor water quality through public warnings.

The complexity of some models can mean that they can be costly to develop and difficult to understand the outputs without specialist expertise. The output of any model is only as good as the data which underpins it which is why targeted validation and calibration monitoring of models is critical.

### **2.3. ASSESSMENT OF PERFORMANCE MEASURES AND PROCESSES**

To assess the performance of the network, data collected by environmental and business monitoring and modelling programmes must be assessed against specific measures and indicators. For the NDC, these measures were scoped around the objectives and outcomes sought by the consent (under the issues shown in Figure 1) and established as targets under Schedule 2.

Where available, quantitative performance measures already in place via other legislative requirements were used, including Department of Internal Affairs (DIA) Non-Financial Performance Measures as well as targets set out under Council's Long Term Plan (LTP) and Asset Management Plan (AMP) processes. This enables consistency and removes duplication. Reporting in relation to the AMP, which feeds into the LTP reporting and planning, is a well-established process. The targets are reviewed regularly as part of the development of each LTP in line with council and community priorities.

However, these existing measures capture only a narrow part of overall stormwater operations, and many are difficult to measure. For instance, under the DIA Non-Financial Performance measures, councils must report on the number of habitable floors flooded each year. This information is difficult to obtain, as it relies on the households providing this information to council. As demonstrated by the 2023 floods in Auckland, only a small percentage of households impacted by flooding declared this to council, instead working with their insurance companies to resolve the issue.

As a result a range of new quantitative and qualitative targets were included in Schedule 4 as part of the consent application and approval. Many of these focus on whether specific processes or programmes needed to achieve the NDC objectives and outcomes were underway or completed.

Understanding how well our processes are working can give an indication of how well the NDC is being implemented. Such measures included setting out what design guidance and models are to be completed, and that Healthy Waters works actively with mana whenua and the community.

These targets assess how we are progressing in achieving consent outcomes and objectives, and are reviewed and updated every 6 years to ensure the NDC remains relevant over time through continuous improvement processes.

It is also useful to look at reporting and assessments done for other purposes, to extract overlapping insights. For instance reviews of Auckland's Water Strategy and Auckland Unitary Plan (AUP) which can help us to understand if the controls around stormwater management which are implemented through both the NDC and the AUP are working.

Programmes which include performance measures or targets to be included in the Strategy are:

- NDC Schedule 2 targets
- Long Term Plan and Asset Management Plan measures
- Bylaw compliance programme
- AUP Plan Effectiveness Reviews
- Auckland Water Strategy Reporting

## **2.4. BENEFITS REALISATION OF PROJECTS AND PROGRAMMES**

Healthy Waters undertakes a range of projects and programmes with the aim of improving the network and improving environmental conditions. Capturing the impact and benefits of these programmes is an important aspect of the Strategy as it helps to demonstrate the impact of Healthy Waters activities including those required by the NDC.

Benefits from Healthy Waters programmes include:

- Improving public safety of assets
- Increasing asset life
- Improving public health and safety by reducing flooding
- Enabling growth
- Improving ecosystem health
- Improving Māori outcomes
- Meeting legislative requirements
- Improving amenity/aesthetics

Reporting on benefits can be both quantitative and qualitative with measures and metrics varying across the programmes. Some programmes may not necessarily be able to quantify results, but it is nonetheless important to recognise the contribution of all of these programmes to the overall picture.

In particular Healthy Waters capital works programme contributes to improvements in water quality and reductions in flood risk. Benefits are captured as part of the Benefits Realisation Strategy which will be directly reported as part of the Triennial and 6-yearly reviews as well as through other department reporting. The benefits are also used to inform initial project decision making and prioritisation.

Healthy Waters has also several specific workstreams which identify specific capital projects, including:

- Urban contaminant reduction programme
- Fish passage improvement programme
- Biodiversity offset bank - Haumanu
- Water quality targeted rate programmes<sup>1</sup>

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<sup>1</sup> Water quality targeted rate programmes include the Western Isthmus Water Quality Improvement, Safe Networks, Safe Septic, Urban and Rural Stream Rehabilitation, Contaminant Reduction, Eastern Isthmus Water Quality Improvement, and Southern Catchment Alignment Programmes

Data gathered from approved Stormwater Management Plans is also used to inform future asset management as well as inform discussions on the future direction of stormwater management methods.

Support of community lead and mana whenua initiatives such as Wai Care, supporting enhancement of private streams as well as collaboration with other infrastructure providers do not provide direct measures but all contribute to the improvement of the region's waterways and coasts.

### **3. HOW THE MONITORING AND EVALUATION STRATEGY INFORMATION WILL BE USED**

The key purpose of the NDC reporting is to understand both the effects of the network on the environment and to understand how well the consent is working to achieve the objectives and outcomes. The range of information set out in the Strategy will be collated and analysed to show an overall picture which incorporates not just environmental state but also process related information and performance measures. As an example, for water quality and stream and coastal health, SoE data will be considered against stormwater quality modelled data including scenario outputs from the FWMT and any other available catchment specific monitoring data to give a picture of the performance of the stormwater network. This will be considered in general for the urban area as well as in detail for representative catchments.

Data from the other pillars will inform performance against the objectives, outcomes and targets of the NDC and the performance of the consent across each of the issues (shown in Figure 1).

It is important that each of the programmes reflected in the Strategy, or established to provide information for the Strategy, provide data and benefits which can be used across the Healthy Waters department and to inform actions and decision making outside of the NDC review framework. With limited budgets within local government, each programme must be designed to ensure that there are multiple benefits and uses for the data beyond simply NDC compliance.

The information from many of the programmes informs planning, decision-making and prioritisation of investment decisions within Healthy Waters as well growth & development decision making. Many of the programmes have been developed in the first instance to inform these outcomes with their use as part of the Strategy a secondary benefit. These programmes also provide data into the Strategy. This feedback loop is illustrated in Figure 4.

Additionally, findings from the Strategy can contribute to informing and providing supporting evidence for council led plan changes such as those required by the NPS-FM, NPS-UD, natural hazards, as well as the review of developer-led private plan changes.

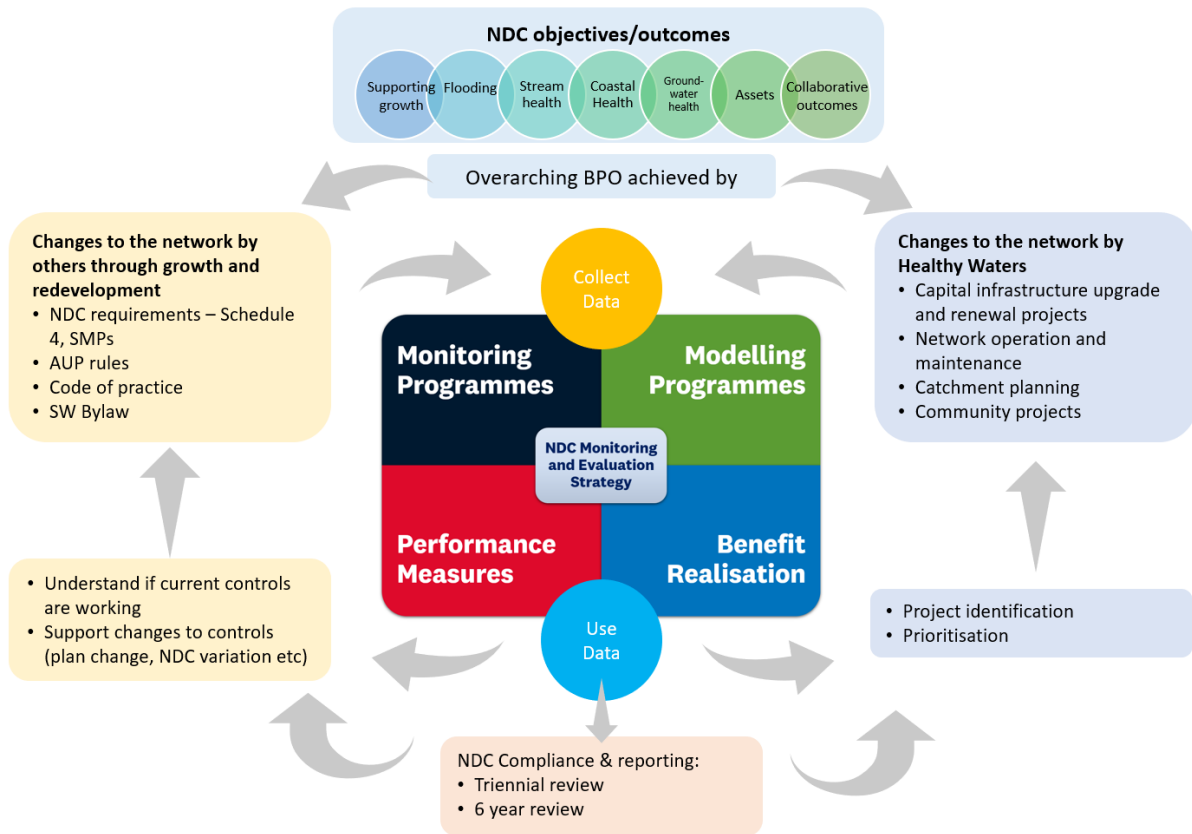


Figure 4: Showing how the Strategy informs decision making around changes to the network and is informed by the outcomes of those changes.

Table 1 outlines how the data collected from the programmes comprising the Strategy will be used in various ways, including to inform:

- Assessment of stormwater performance, including:
  - understanding the environment
  - understand impact of discharge
  - demonstrate improvements made
  
- Planning, decision-making and prioritisation of investment decisions within Healthy Waters, including delivery of:
  - capital works projects such as stream erosion remediation and flooding mitigation works,
  - routine operation and maintenance activities,
  - catchment planning and asset management
  - growth & development decision making,
  - future plan changes,
  - community empowerment, mana whenua and compliance initiatives
  - model calibration and development, and
  - public awareness
  
- Council reporting, including:

- Asset Management Planning (AMP) and Long-term Plan (LTP)
- stakeholder engagement / governance
- NDC reporting including assessment of Schedule 2 targets

Ultimately, the data and information will be summarised and analysed as part of each NDC review report (triennial and six-yearly). The review stage is the checkpoint of the consent, where there is an opportunity to combine and correlate different sources of data to understand if the BPO and current controls (i.e., NDC requirements, AUP rules, code of practice, bylaw) are working as anticipated and whether any changes are needed based on result of the analysis as well as on updated understanding and technology.

The next NDC reporting is the triennial review which is required to be submitted September 2025. Allowing a lead time for preparation and analysis, data captured in 2024 and prior will inform the 2025 review. Over time each review will build up a longer-term picture of the impact of the NDC and how that is changing over time.

Table 1. Multiple uses for the data gathered under the NDC Monitoring and Evaluation Strategy. This shows that different types of data are used in different ways and each brings a different value to the Strategy.

Programmes	Understanding the environment	Understand impact of discharge	Demonstrate improvements made	Capex programme and prioritisation	Operations and maintenance	Catchment planning and asset management	Growth & development decision making	Future plan changes	Community / mana whenua / compliance initiatives	Model calibration and development	Public awareness	NDC reporting	Stakeholder engagement / governance	AMP/ LTP reporting & planning
	Assessing performance			Planning, decision-making and prioritisation of investment decisions								Reporting		
<b>Monitoring Programmes</b>														
State of the environment monitoring	✓							✓		✓	✓	✓		
Watercourse assessments	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Model Validation Monitoring	✓	✓		✓			✓			✓				
Safe Networks			✓	✓	✓	✓			✓	✓			✓	
Device effectiveness targeted monitoring		✓	✓				✓			✓		✓		
Hydrological monitoring	✓				✓	✓				✓				
Cultural monitoring	✓	✓				✓	✓		✓			✓		
Asset inspections and CCTV				✓	✓	✓	✓			✓			✓	
LIDAR and aerial photography	✓					✓	✓	✓		✓				
Citizen science	✓					✓								
Post event monitoring				✓	✓	✓	✓	✓	✓	✓	✓	✓		
<b>Modelling Programmes</b>														
Freshwater Management Tool	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	
Integrated coastal modelling	✓					✓		✓		✓				
Flood, hydrologic and hydraulic modelling	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	
Stream Erosion modelling	✓	✓		✓	✓	✓	✓	✓		✓		✓		
Asset Criticality Programme		✓		✓	✓	✓							✓	

Programmes	Understanding the environment	Understand impact of discharge	Demonstrate improvements made	Capex programme and prioritisation	Operations and maintenance	Catchment planning and asset management	Growth & development decision making	Future plan changes	Community /mana whenua /compliance initiatives	Model calibration and development	Public awareness	NDC reporting	Stakeholder engagement / governance	AMP/ LTP reporting & planning
	Assessing performance			Planning, decision-making and prioritisation of investment decisions								Reporting		
Stream Criticality Programme	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
Safeswim	✓					✓					✓		✓	
<b>Assessment of Performance Measures</b>														
NDC Schedule 2 targets		✓				✓	✓					✓		
Long Term Plan and Asset Management Plan targets				✓	✓							✓	✓	
Bylaw compliance programme		✓	✓	✓	✓							✓		
AUP Plan Effectiveness Reviews		✓					✓	✓						
Water Strategy Reporting			✓								✓	✓		
<b>Benefits Realisation</b>														
Capital infrastructure upgrade and renewal projects		✓	✓	✓		✓				✓		✓	✓	
Urban Contaminant Reduction Programme			✓	✓	✓	✓	✓							
Fish passage improvement programme			✓	✓		✓							✓	
Biodiversity Offset Bank – Haumanu			✓			✓								
SMP and development approvals		✓	✓		✓	✓		✓		✓		✓		
Supporting mana whenua and community projects			✓			✓			✓		✓			
Water Quality Targeted Rate Programmes			✓			✓							✓	
WaiCare	✓					✓			✓		✓	✓		
Supporting enhancement of private streams						✓			✓		✓	✓	✓	
Collaborating with infrastructures providers				✓	✓	✓	✓	✓				✓	✓	✓



#### **4. WHAT WE LEARNED AND WHAT IS NEXT**

The comprehensive review of the NDC, although conducted only three years after the consent was granted, has proven to be a valuable source of understanding of the current stormwater management and reporting on the network performance. It offered insights to guide the consent implementation, as well as improvements and adjustments needed. Key takeaways included the need of enhancement of the Strategy and changes to certain performance targets, especially in assessing flood risk.

The Strategy has been renamed and reshaped and now consolidates information under the four core pillars monitoring, modelling, performance measures and benefit realisation of projects. The Strategy will leverage from both existing programmes of work and new identified programmes to address existing gaps. Efficiencies will be achieved by alignment and best use of data obtained from existing working programmes in addition to creating new target programmes towards achieving the objectives and outcomes of the NDC.

For instance, the Freshwater Management Tool model for water quality is now entering the implementation phase with an opportunity to better understand effects of contaminants loads and impacts of interventions. In addition, the FWMT is now being linked to coastal models to provide more comprehensive assessment of stormwater impacts to the wider receiving environment. The benefits of collating network performance data under the Strategy is the ability to influence existing business prioritisation and direction of stormwater network management based on this and other work within Healthy Waters and the rest of council.

New programmes of work include scoping a targeted Stormwater Device Monitoring programme, which will both inform how the devices are performing as well as be used to improve the representation of those in the Freshwater Management Tool model. The development of a Stream Critically Framework will better enable the prioritisation of works in streams. Any new programme must have a clear scope and direction, and when practicable, combine multiple benefits across the business seeking the efficient use of limited ratepayers funding.

Future expectations is that use of technology, such as drones and artificial intelligence (AI) is increased to assist in business operations and assessment of performance. A recent example was the use of drones for surveys after the storm events, which was valuable to quickly identify areas that needed urgent clearing of debris and fallen trees.

To address the need for meaningful flood performance indicators and responding to the significant storm events which occurred in early 2023, Healthy Waters is working on new targets for the assessment of performance. As part of the flood recovery, a framework is being developed on how to define risk to a property (e.g., intolerable or tolerable risk). The framework considers the safety risk at 1% AEP event and the frequency of flooding in different flood events. This has been developed to be applied property by property for the purposes of property

categorisation rather than regional scale, and therefore may need to be modified if to be used as future performance measures.

## **5. OPPORTUNITIES - ADVOCATING FOR PAN-REGIONAL PERFORMANCE MEASURES AND ASSOCIATED ASSESSMENT TOOLS**

Auckland is not alone in trying to work through stormwater management challenges, with councils across the country all facing increased scrutiny for service delivery in a time of increased climate uncertainty and community expectations as well as aging infrastructure. However, the country's pool of technical experts and engineers in stormwater management is limited, and their day-to-day pressures mean they have little bandwidth to work strategically with other regions. As a result, technical collaboration across New Zealand is currently piecemeal and constrained.

As every council is facing similar issues and undertaking similar works, it is simply inefficient for each territorial authority to develop different performance criteria or to approach similar problems in different ways. Notably, powers for Taumata Arowai to develop nation-wide stormwater performance measures are still in place, meaning there is the opportunity to enable the development of consistent performance measures across New Zealand. However, it is imperative that institutions actively working in stormwater management lead the scoping and development of such measures, based on operational experience and learnings, such as those discussed in this paper.

To address this current stormwater capacity and capability constraint, the establishment of a well-resourced, pan-regional "Centre of Excellence" is proposed. This would enable cost-savings and efficiencies through the sharing of expertise and pooling of funding to develop not only nation-wide performance measures, but more importantly the associated assessment resources and tools.

As outlined in this paper, assessing stormwater management is complex, requiring a range of data and information. To enable this, outputs delivered by the Centre of Excellence could comprise amongst other things:

- Standardisation of risk assessment and resilience planning methodologies and tools, e.g., through the establishment of standard risk assessment criteria (such as defining tolerable and intolerable risk and associated timeframes), and the associated development and update of detailed catchment based tools (e.g., mapping, aerials, AI based assessments, models).
- Standardisation of whole-of life asset management methodologies, e.g., cost benefit and feasibility analyses to inform business cases.
- Development of standardised technical codes and guidance, such as development codes and best practice standards.
- Provision of digital architecture for storing, analysing, and communicating data, including user-focussed channels and/or platforms for

communicating risk, reporting progress towards addressing or mitigating risk, enabling communities to make informed decisions, and empowering communities to participate effectively in planning and delivery.

- Enabling knowledge sharing and transfer, for instance through development of information sharing platforms and portals, establishment of professional networks, and collective staff training.

The importance of having a central and well-resourced organisation to develop these tools and resources is underscored by the rapid development of technological tools such as models and AI, which are inherently expensive and resulting in some instances, consultancies charging public agencies multiple times for the same tool. A dedicated Centre of Excellence would also be able to gather operational learnings and make these available to central and local government, enabling the much-needed and often missing linkage between policy development and effective on-the-ground implementation.

A recent example of a “Centre of Excellence” was the technical working group specifically established to develop risk assessment methodologies to inform the government purchase of properties impacted by the 2023 extreme weather events. This working group brought together a range of experts to define the “categorisation” of properties through a series of risk assessment methodologies, which are now being rolled out and tested through property purchases. This work is also being used to develop revised NDC performance measures for flooding, as identified above.

Provisions under the now-repealed Water Services Entities Act 2022 did in part enable such a Centre of Excellence through section of 137A, which gave the Minister powers to direct the proposed water services entities to ‘share services’ for a range of functions. This meant that experts across the entities would have needed to work together to develop, deliver and update operational tools and resources specifically aimed at delivering efficient and effective services. The benefits of these provisions were already highlighted by the development of the draft National Engineering Design Standards (NEDS), which was promulgated through the section 8A Direction of Shared Services under Schedule 1 Transitional, savings, and related provisions.

While the current coalition government has repealed this Act, some form of water reform will still occur. There will therefore be opportunity to advocate for a Centre of Excellence as this replacement legislation is developed and consulted on. The proposed Infrastructure Agency may also provide such an opportunity. What this would look like will need to be worked through, however its foundations must be centred around the operational needs and learnings of stormwater network operators.